

Special Session Proposal for INFUS-2026

Conference Name: International Conference on Intelligent and Fuzzy Systems (INFUS 2026)

Location: Cankaya University, Ankara, Türkiye, Dates: July 07-09, 2026

Title: Decision-Making Utilizing Fuzzy-Intelligent Systems for Sustainable Circular Economy

1. Scope and Motivation

One of the most challenging tasks in the 21st century is transitioning from a linear economy to a circular economy (CE). This special session looks at how Intelligent and Fuzzy Systems can help make the Circular Economy a reality. Fuzzy Logic provides the foundation needed to address the fundamental problems of sustainability, such as unclear product lifecycles, uncertain material quality in recycling, and subjective environmental impact metrics. Standard artificial intelligence provides the processing capacity. It requires a fundamental shift in how we design products, manage supply chains, and process waste. However, in circular strategies, real-world data, such as product life lengths, resource quality, and consumer behavior, are often imperfect, unpredictable, and subjective. The purpose of this session is to talk about the difference between "crisp" optimization and the "fuzzy" reality of sustainable production and consumption. Fuzzy-intelligent systems offer a robust mathematical framework for handling this ambiguity. By integrating fuzzy Logic with computational intelligence, we can create decision-support models. This session will explore how advanced fuzzy techniques (such as Fuzzy Sets, Type-2 Fuzzy Sets, Interval Fuzzy, Bipolar fuzzy sets, Intuitionistic Fuzzy Sets, Spherical Fuzzy Sets, etc.) can be operationalized to drive the "Circular Transformation" called for by the conference theme.

2. Topics of Interest

We welcome submissions that enhance the following domains about the Decision-Making Utilizing Fuzzy-Intelligent Systems in the Circular Economy:

1. Fuzzy Multi-Criteria Decision-Making (MCDM) for sustainable supplier selection in circular projects.
2. Uncertainty modeling in Life Cycle Assessment (LCA) utilizing fuzzy systems.
3. Fuzzy, Intelligent, and evolutionary algorithms for optimizing the collection and redistribution of end-of-life products.
4. Decision systems utilize fuzzy logic to select materials based on trade-offs between recyclability and durability.
5. Innovative Waste Management with fuzzy-controlled systems.
6. Sustainable Consumer Behavior Analysis using linguistic variables and fuzzy cognitive maps.
7. Closed-Loop Supply Chain Resilience modeling under uncertainty.
8. Industrial Symbiosis Optimization with fuzzy intelligent systems.
9. AI and Decision Support Systems in Automated Circular Manufacturing (Industry 5.0).

3. Name of Sessions Chairs:

a) **Dr. Totan Garai**

Affiliation: Department of Mathematics, Syamsundar College (The University of Burdwan), Syamsundar, Purba Bardhaman, West Bengal-713515, India

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b) **Prof. James J. H. Liou**

Affiliation: Department of Industrial Engineering and Management, National Taipei University of Technology, Taipei, Taiwan

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c) **Prof. Otavio Oliveira**

Affiliation: Production Department, Sao Paulo State University (UNESP), 333 Guaratingueta, São Paulo-12516410, Brazil

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4. Biography of Sessions Chairs

- a) **Totan Garai** has been an Assistant Professor in the Department of Mathematics at Syamsundar College, Purba Bardhaman, West Bengal-713424, India, since Nov 2019.. Dr Garai was awarded his doctoral degree in mathematics (in science) in August 2018 at the Indian Institute of Engineering Science and Technology, Shibpur. Before joining IEST, Shibpur, India, as JRF, he completed his MSc (2011-2013) in Mathematics at the Indian Institute of Technology, Madras, India. Dr. Garai has 9 years of research experience. Dr. Garai's primary research areas include fuzzy decision making, optimization modeling, inventory modeling, and decision support systems. The total number of publications in the international pre-review Journal is # 41 (#36 SCI & Scopus). His current Google Scholar citation is #780+(H-index 18 & I-index 26). He reviews over 200 articles in various SCI & Scopus index pre-review journals published by Elsevier, Springer, Wiley, [Taylor & Francis](#), World Scientific, Inderscience, and MDPI Publishing House. He is an **Editor of international Journals, Franklin Open (Associate Editor, Scopus, Elsevier), American Journal of Computational Mathematics (Associate Editor), American Journal of Operations Research, Journal of Intelligent Systems in Current Computer Engineering, Neutrosophic Systems with Applications, and Decision Making and Analysis**. Garai has experience as a lead Guest Editor in a Scopus-indexed international Journal.

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- b) **Prof. Dr. James Liou** received his Ph.D. degree from the department of Aerospace Engineering of University of Missouri-Columbia, U.S.A. in 1996. After returning from United State, he worked as an engineer in the Civil Aviation Administration of Taiwan (CAAT) from 1997-2004. During this period, he helped Taiwan to sign the Bilateral Aviation Safety Agreement (BASA) with United State. He is a certified engineer in aircraft structure. He also helped the first Taiwanese company to obtain a certificate of

Federal Aviation Administration (FAA) in manufacturing approval for aircraft components. In 2004, he changed his career and became an assistant professor in the Department of Air Transportation at the Kainan University, Taiwan. He turned out to be an associate professor in 2008. Currently, he is a professor in the Department of Industrial Engineering and Management at National Taipei University of Technology. Dr. Liou's primary research area is data mining, including feature selection, clustering, ensemble methods, and decision support system. Recently, he became interested in applying data mining algorithms to solve some business problems in customer behavior, service quality, e-commerce, supply chain management, global logistics and safety science. He is the editor board member of four international journals. He has published more than 100 international journal papers, including Journal of Air Transport Management, Expert Systems with Applications, International Journal of Production Research, Knowledge-based Systems, Tourism Management, Quality & Quantity, Applied Soft Computing, Information Sciences, Applied Mathematical Modelling and European Journal of Operational Research, Technological and Economic Development of Economy etc.

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- c) **Prof. Otavio Oliveira** is a Full Professor in the Department of Production, School of Engineering and Sciences, São Paulo State University (UNESP), Guaratinguetá campus, Brazil. He holds a PhD in Civil Engineering, a Master's degree in Business Administration, and a Bachelor's degree in Civil Engineering, and completed postdoctoral training in construction management. His academic and professional background includes experience in construction management. He has extensive experience in research, teaching, and academic management. His research focuses on decision support systems, sustainability, integrated management systems, and Industry 4.0/5.0. Prof. Oliveira has published extensively in international journals and books and currently serves as Editor-in-Chief of the Springer journal Environment Systems and Decisions (<https://link.springer.com/journal/10669>), in addition to acting as Guest Editor and Editorial Board Member for several international journals.

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